ESTHER DYSON'S MONTHLY REPORT

Release 1.0®

VOLUME 22, NO. 1 | 28 JANUARY 2004 | www.edventure.com

The Semantic Earth

INSIDE

THE SEMANTIC EARTH 1
The Slowly Bending Knee 3
Present and Future: Four Examples 5
The Story of the Point 8
Box: Collaborative mapping
Prepare the Data 9
Geographic Data Tech: Bright and shiny
Manipulate & Integrate Data 12
ESRI: Beyond the layered look
MapInfo: Intelligent places
Aqui Systems: The traveling salesman
Distribute Map Data 15
Box: Why can't we all just agree?
Distribution Infrastructure 18
Rosum: Finding you indoors
Wheels of Zeus: Woz happenin'
uLocate: Total location awareness
Telmap: Protocol for distribution
Collaborative Graffiti 23
GeoURL & Localfeeds: The where of blogs
Urban Tapestries: The culture of location
Cimarrones: Virtual graffiti
Collaborative photo tagging
We Are Here
Resources & Contact Information 31

Register for PC Forum 2004, March 21 to 23. Find the location and other information at www.edventure.com/pcforum.

BY DAVID WEINBERGER

I first met David Weinberger in the late 80s, when he had just left six years of teaching philosophy at Stockton State College in New Jersey and joined the marketing department at Interleaf, one of the first companies to make extensive commercial use of SGML (Standard General Markup Language). As Weinberger notes: "Our [common] metadata roots go way back."

From structuring and annotating tame, human-produced documents, Weinberger is now considering how to structure and annotate in the wild – out in the real world of maps and geography and physical places. In his wonderful book "Small Pieces, Loosely Joined" (2002) he looks at how the Web affects the most basic ways we understand our shared world.

Beyond "Small Pieces," Weinberger is also a co-author of "The Cluetrain Manifesto" (1999) and started his own blog way back in 1999. It is called JOHO, for Journal of the Hyperlinked Organization.

In this issue of Release 1.0, *he focuses more tightly on how maps are making the same transition from domesticated, static representations of one person's reality to a linked world of annotations referring to or reflected from physical locations and artifacts.*

– Esther Dyson

Every business in the world is headquartered on earth. Every employee works somewhere. Every customer is at some location at every moment. Every product is delivered to some spot and every service is performed at some coordinates. Every transaction involves at least one place – and usually more than one. And yet,

{ *continued on page 2* }

Release 1.0® (ISSN 1047-935X) is published monthly except for a combined July/August issue by EDventure Holdings Inc., 104 Fifth Avenue, New York, NY 10011-6987; 1 (212) 924-8800; fax, 1 (212) 924-0240; www.edventure.com. It covers the worlds of information technology and the Internet, including wireless communications, security, business models, online services, tracking systems, identity management and other unpredictable topics. . .and the policy issues they raise.

EDITOR: Esther Dyson (edyson@edventure.com)

PUBLISHER: Daphne Kis (daphne@edventure.com)

MANAGING EDITOR: Christina Koukkos (christina@edventure.com)

CONTRIBUTING WRITERS: Dan Gillmor (dan@gillmor.com), John Hagel (john@johnhagel.com), Clay Shirky (clay@shirky.com), Jeff Ubois (jeff@ubois.com), Dave Weinberger (self@evident.com)

CIRCULATION MANAGER: Brodie Crawford (brodie@edventure.com)

SYSTEMS MANAGER: Geoff Clarke (geoff@edventure.com)

CONSULTING EDITOR: Bill Kutik (bill@kutik.com)

Copyright © 2004, EDventure Holdings Inc. All rights reserved. No material in this publication may be reproduced without written permission; however, we gladly arrange for reprints, bulk orders or site licenses. Subscriptions cost $795 per year in the US, Canada and Mexico; $850 overseas.

until recently, businesses have systematically managed location information only for processes directly concerned with moving people and goods. Why has the literal common ground of business been largely absent from business applications?

The answer is obvious: Integrating information about locations – beyond including an address field in your customer database – has required specialized skills and a budget that often was larger than the potential benefits of such a project. And now we are integrating not just information *about* locations, but information *into* locations: PCs and PDAs and other user or sensor devices are aware of where they are and what surrounds them, often receiving local information in realtime and giving feedback. Location is more complex than simple longitude and latitude in a database, involving a world full of objects, people and processes that are moving around relative to one another and to the earth, referred to in terms that humans understand quite precisely but that can be impossible for computers to parse. Therefore, Geographic Information Systems (GIS) has been stuck where information retrieval was in the early '90s: a technology that could have transformative effects if only it didn't require high priests to build and maintain it.

The problems the GIS industry addresses are so tough precisely because the earth is so simple. The earth is a wet rock. We inhabit it with meaning. Whether those meanings are discovered, invented or revealed, they are dependent on us. You see that dependency clearly in the diversity of maps we draw. Maps can be inconsistent and contradictory in every aspect – what objects we see, at what scale we draw them, where we etch the boundaries, which words we use as labels – because our human projects are inconsistent and contradictory. There is no more hope for a single, universal map than there is for a single, universal language, because the thing we are mapping – the earth – has no language, no culture and no projects of its own. It is too real for that. All its meanings are attributed.

The GIS industry is now breaking out of its box. The technology, data representation, economics and security-driven needs for real-time geographic information are coming together. Businesses are

becoming location-aware, making existing processes more efficient and enabling new processes and new relationships to emerge.

But something even bigger is happening.

Thanks to the constellation of technology that enables digital networks to be laid over the places of the earth, wherever we are we will be able to hear the human conversation that has occurred about that place – the history that occurred there, the aesthetics to be savored, the commerce transpiring at that very moment, recommendations offered by strangers and friends. The mute places of the earth are being given voice, and the voices are, of course, ours. Meanwhile, the places themselves are becoming digitally alive and are noting our presence, too.

This is happening now. It is not just spawning innovative new businesses. It will change our most basic sense of what it means to be in a place.

Where We Are: The Slowly Bending Knee

If inflection points are like knees, the one we're at with GIS infrastructure is like a knee slowly bending. As Joe Francica, editor of the GIS industry magazine *Directions Magazine* says, "The pace of adoption has been steady but not at the rate we thought it was going to go. There was a peak of interest in the early '90s as the cost of data dropped, but then it hit a plateau." In the decade since then, the pieces have fallen into place one by one, sometimes quietly like snow and sometimes with an almost audible thud:

- Systematic **mapping data** has been available through the US government since 1879, but the addition of data from satellite and unmanned aircraft has increased the scope and detail significantly.
- Longitude and latitude were standardized at the International Meridian Conference in Washington, DC in 1884. Now industry and government data **standards** are emerging for specifying the things – regions, buildings, roads, etc. – found at those positions. (SEE PAGE 16.)
- With the advent of the **Global Positioning System** (GPS) – and the US government's removal of intentional timing errors from its GPS transmissions in 2000 – anyone in the world with a device capable of receiving triangulated signals from satellites can tell where she is within a few meters. As GPS

chips come down in price and size – in March, Trimble and Infineon Technologies announced a GPS chip smaller than a square centimeter – more of our devices will know where they are. With Enhanced 911, the US government mandate that by the end of 2005 all cell phones be aware of their location within 50 to 150 meters, every employee, parent and child or car equipped with a cell phone will be locatable. Finally, with the increased use of radio-frequency ID (RFID) tags, the position of business assets can also be tracked. (SEE **RELEASE 1.0**, JUNE 2003.)

- The electronic **devices** required to display and interact with maps and GIS data, and to detect and interact with other located devices, are becoming more affordable, more powerful and more portable.
- The Internet allows GIS data and applications to be available anywhere there is a connected browser. With the growth of **mobile access**, the realm of "anywhere" has grown significantly, a fact of special importance for location-based services.
- **Web services** can hide much of the complexity of mapping applications while their outputs are available to developers and users who are experts in their business rather than in mapping.

Obstacles to the enterprise-wide and cross-enterprise integration of GIS remain. (Of course, those obstacles are also business opportunities.) In particular, while there has been progress on standards, problems with sharing GIS data are rooted in the nature of maps themselves.

First, there is the problem of the visible. The digital photographs of the earth, from which much mapping data are derived, have limited resolution, so it can be hard for computers to distinguish a shaded area that is a shed from a shaded area that is a tank. More intractably, different applications necessarily look for different types of entities and have different ways of referring to the same entities. This difference in interests and nomenclature can make integration of mapping data into business applications an art as well as a science, as the proponents of Standardized General Markup Language (SGML) discovered in the early 1990s.

While feature extraction worries about what's visible, the invisible lines that separate regions of the earth raise their own problems. Agreeing on these lines sometimes takes diplomats and sometimes takes wars, but that's just the beginning of the disambiguation process required. Some boundaries are imprecise: Where exactly is the border of France's "wine region"? Names change (back): Leave from Leningrad and return to St. Petersburg. Names vary from language to language: When you're done

visiting Cologne, why not take a side trip to Köln? Many place names refer to more than one place: Al Hamra means the color red in Arabic, and it also refers to at least 49 cities in the Middle East. Regions are messily nested: The voting precinct map of Brookline, MA, divides the city into 16 pieces that spill messily across three postal districts and has nothing to do with the Verizon coverage map. There can be no perfect normalization of mapping metadata because the semantics of places is too deeply embedded in human language, politics and culture.

These are not new problems, but they are becoming newly important and more complex because of the growing importance and complexity of GIS applications. The problems result from the fact that, as Howard Veregin, former geography professor and current director of GIS operations at Rand McNally, says, "Maps lie in order to tell the truth."

They have to, for maps have value only because of what they leave out: A map with everything in it would be as hard to read as the world it's trying to guide us through. And even what's left in is expressed through social conventions. "For example," says Veregin, "when we get data for our road atlas, we can't just accept other companies' classifications. They all have different ways of understanding what a fast road is versus a slow terrible road. You can't just take that information and make different colors or thicknesses on a map – the number of lanes may change from one section of a road to the next, but functionally it's still a highway." If the thick red line on our road map were drawn realistically, it wouldn't be nearly as useful.

Maps may look like pictures, but they're actually tools. Tools are gauged not by their realism but by their utility, which is always relative to some specific purpose. So of course there can't be a unified, normalized, universal semantics of maps. While integrating geographic data is getting easier because of the growth of standards, it is never going to be perfect or even easy.

The Present and Near Future: Four Examples

The evidence that geographic data is entering the standard business vocabulary is everywhere. Oracle 8i included spatial primitives – points, lines and polygons – and with its acquisition of Informix, IBM got a spatial "data blade" that gave it similar capabilities. Now both companies are significantly increasing their spatial capabilities: Oracle 10g will include sophisticated spatial handling and IBM recently an-

nounced that DB2 and WebSphere will offer location-based services in conjunction with GIS pioneer ESRI (PAGE 12). Microsoft has big plans for its MapPoint services (PAGE 17). And this May the University of Pennsylvania's Wharton School, International Data Corporation and *Directions Magazine* will sponsor the Location Technology & Business Intelligence Symposium, what conference chair Francica says is the first on the business applications of location technology. "For it to become more mainstream, we have to change the terminology a bit," he points out.

In fact, the development of a number of geodata standards and the proliferation of location-aware devices over the past few years have already started transforming business applications:

Route optimization

Sears Roebuck uses GIS in one of its most "traditional" ways: to optimize the routes of the company's 10,000 service technicians nationwide as they make their 13 million service calls a year.

With the help of ESRI, Sears developed a UNIX-based GIS application, Computer Aided Routing System (CARS), that integrates mapping data from Geographic Data Technology, a supplier of cleaned-up geographic data, with other parameters such as how long it takes to get to a customer site, how long the call is likely to take, and the times when the customer is at home.

The mapping data and task-card information are integrated with capacity management software, developed independently by Sears, to ascertain how many calls to take in a day, based on the estimated time required for each repair. According to Steve Jones, Sears Roebuck's national routing manager for product repair services, CARS has cut transit time by 30 percent, enabling each technician to complete an additional half a call per day on average. Further, Jones says that a single support person can now create routes for 200 people, versus 40 before.

Facilities management

Boston-based Archibus, a leader in the facilities management space, has developed mapping software that tracks business assets and processes. For instance, it can track hospital crash carts so that when an ER doctor yells "Stat!" a caregiver can punch in a code to find the nearest defibrillator. And, says Bruce Forbes, founder, president & CEO, unexpected patterns can emerge. For example, a computer manufacturer mapped which salespeople in the various sales offices had exceeded their sales quotas and discovered that they were sitting together. The company split up

these super-salespeople on the hypothesis that they would teach those around them how to succeed. In the next few quarters, says Forbes, the number of salespeople exceeding quota went from a handful to more than 80 percent. (And, presumably, a new quota was set.)

Insurance

By combining GIS information from the UK's Ordnance Survey with the greatly improved ability of the UK's Meteorological Office to localize weather predictions, Kleindahl Partners, a London-based consulting firm, hopes to provide the two agencies with new sources of revenue. For example, says Kleindahl managing director Simon Williams, if it's going to be a hot, sunny weekend in one local area but rainy and chilly in another (it is the UK, after all), a supermarket chain can stock the right local stores with ice cream and umbrellas. "This can be worth millions of pounds in opportunity cost to them," Williams says. The insurance industry thinks that with this data, they'll be able to send inspectors out just once a year, "to make sure the model is calibrated right," rather than four times, saving about £50 million ($80 million). These dynamic weather models, tied to precise enough geographical locations, will also help insurance companies improve their risk-pricing model by more accurately assessing meteorological risks, and may make them more efficient in sending out claims adjusters in times of crisis. Kleindahl is currently talking with all the major UK insurance companies.

San Francisco

The City and County of San Francisco is aggressively integrating GIS across the board. Some of the applications are straightforward: At the city's website, you can go to My Neighborhood, type in your address, and find the name of your local representative, local congressperson, nearest library, when your street gets cleaned, and more. But others are more unusual: At SFprospector.com, local real estate companies list available properties; companies thinking of moving to San Francisco can browse them and see if there are any "synergies," such as proximity to partner companies, rail lines, and so on. According to Erich Seamon, technology chief for San Francisco, there are currently about 600 available properties entered into the listings by local real estate agencies. "Our mayor really loves this," he says. "It's a quantifiable way of pulling money into the community."

Seamon's group has integrated mapping data into other municipal information systems. Crime data gets logged into a database and put on a map accessible through the Web. By integrating that information with demographic data, patterns of criminality can appear: If crime is seen to be clustering near bars, for example, it can affect police

assignments. Similarly, by plotting demographic data against the location of social services, the city can see whether, for instance, birth control centers are near where young people hang out. San Francisco's ParkScan puts volunteers, armed with iPAQ handhelds loaded with maps, into local parks where they note problems such as graffiti, dirty needles and broken glass. Election precinct boundaries have been adjusted using GIS. The Real Estate Department, Public Works, Assessor's Office, and Treasurer/Tax Collector Office all use geodata in their daily work.

San Francisco shows us the near-term future of mapping information: GIS data used broadly throughout the enterprise, providing better contextual information, enabling location-based services.

The Story of the Point

So why has it taken the future so long to arrive? For one thing, the GIS industry has been maturing. It is one of the more complicated information aggregation and delivery industries, with sub-markets for each important conceptual stage:

1. **Generating** and assembling cartographic data
2. Cleaning it up and **enhancing** it so it is usable in specific applications
3. Building the software that lets customers **manipulate** the data, creating everything from simple visual displays to complex data integration and analysis capabilities
4. **Distributing** the mapping data and applications through a dedicated device such as a car's navigational system, in a browser or in a specialized client
5. Agreeing on **standards** to ease the integration of GIS applications with mainstream business applications
6. **Annotating** the physical world and rendering its meaning and history more accessible through stationary information-emitting devices and mobile devices that change content as they move through space

As conditions have conspired to make it easier for GIS data to be integrated into more enterprise processes, the eyes of this segment of the industry have grown wide. Using location data only to draw maps – which just a few years ago was the industry's main value – now feels like an embarrassing under-utilization of that resource. The industry is champing to do more, and telling them they're in the mapping

COLLABORATIVE MAPPING

With location-aware devices becoming more common, data about where they have been can be aggregated to draw maps of actual travel patterns.

For example, during October and November of 2002, the Waag Society – a research institute founded in 1994 in Amsterdam – invited Amsterdam residents to wear a special GPS system connected to a PDA wherever they went. Over 100 volunteered, and for eight weeks a central server recorded their positions in real time via a GPRS (General Packet Radio Service, the "2.5G" network) internet connection. The server plotted their aggregated paths onto a black page projected in high resolution at an Amsterdam exhibition on cartography. The color of the lines represented the number visits to a site, going from a ghostly white to a vivid red.

The Waag website has examples of the maps, including a map of the path worn into the ground by Jouke who was training for a marathon, the fair-weather route ridden by Irene who doesn't ride her bike when it rains, and the deep grooves worn in by aggregated commuters.

While the Waag project was in part intended as a participatory artwork, imagine tourist maps created by seeing where tourist feet actually have trod, or shopping maps etched from the tracks left by bargain hunters. Companies such as uLocate and Wheels of Zeus (below) could aggregate data as a by-product of their primary purpose. . .and open a Pandora's Box of privacy issues. The Waag project's FAQ addresses privacy in response to a question about how appealing a system like this would be to Big Brother or, say, McDonald's: "You bet. And telcos are working hard at it, not by using GPS but by bringing location-based services to GSM. Of course we were very much aware of this side to the project. It was exactly a point we were trying to raise awareness of." As usual, the answer is partly notice and consent, and partly social conventions that will have to develop over time.

industry is like telling the telephone industry that their job is just to let people make phone calls. Jack Dangermond, founder and president of ESRI, comments, "We're a core technology, not unlike a database management system." John Young, director of enterprise solutions at ESRI and former CIO of the CIA, begins his description of his company's mission thus: "GIS is really more about knowledge management and decision support than about maps. Geographic location is simply the integrating attribute." These are the sounds of a company seeing an opportunity so large that its current market feels like a pigeon hole.

Prepare the Data

The first step is to generate the data. While there are some academic and private sources of cartographic information, historically governments have been the biggest source. This fact is not surprising. Since countries are defined by imaginary lines on the earth, governments have a direct interest in accurate maps. And since charting the earth is a big project, it's not surprising that governments have been the most important source of cartographic data.

Some of that information – and even the information about the information – is kept secret. For example, while there are now commercial satellites that can see

objects just one meter in size, it's quite possible that government satellites do better, but their actual resolution is an official secret.

On the other hand, since 1879, the US Geological Survey has been a public source of maps and mapping data about the national domain, expressed in the familiar 1:24,000-scale Topographic Quadrangle Maps. In 1960, the US Census Bureau published its first road census. These days, the USGS offers a wide variety of maps as well as satellite photos and downloadable digital data. Significantly, the US Census started offering access to the Topologically Integrated Geographic Encoding and Referencing system (TIGER) database of geographic data based on the 1990 census. TIGER files contain information about geographic features including rivers, lakes, legal boundaries, roads and street number ranges for streets.

This puts into the public domain a database of information that's available for free and that's detailed enough to be useful, but raw enough to allow the private sector to make money enhancing, finishing and delivering it.

Geographic Data Technology: Bright and shiny

The next step is to scrub, enhance and organize the data so that it's useful in many contexts. When Don Cooke founded Geographic Data Technology (GDT) in 1980, he had already been working in the field for 13 years, fascinated by the question of how you turn a map into data. "It's very easy to make a mistake and call the map a picture and treat it as an image," he explains. "But there's so much more to a map than to a picture. Intuitively we know there's information behind it. We see a line and know it's a street and that it's got to have a name, and addresses and a zip code [and people who live and work there]. So, if you're going to do a coding of a map, you have to figure out how to store that information." This was a problem Cooke had begun working on as a senior at Yale.

In 1979, after selling Urban Data Processing, a company he had founded in 1968, Cooke found himself with some money. "My wife and I were living like hippies off the grid in Vermont with two babies. Suddenly we looked at each other and said now we could rejoin the world." So he bought a computer and hung out his shingle.

Today, GDT is one of the leaders in cleaning up and enhancing geographic data in order to supply it to the mapping industry – including Microsoft, MapQuest and ESRI. GDT sells both to resellers and to end-users such as Sears, above. The private

company has 500 employees and, according to industry estimates, revenues of $30 to $50 million.

GDT, like all major mapping data supply companies, uses TIGER data as the foundation of its US-based products. "We've been picking away at it," says Cooke, "getting the alignment of streets more accurate, getting zip codes more accurate, and finding the one-way streets." He adds, "Other companies send people out with a laptop and GPS. We don't. We have a compilation approach where we buy lots of maps, aerial photos and Department of Transportation video logs to see what the signs say at the exit ramps, what the road conditions are, and so forth. Most stuff, like that done by the government, is in the public domain." GDT aggregates and continually updates such data and stores it in a master database.

GEOGRAPHIC DATA TECHNOLOGY INFO
Headquarters: Lebanon, NH
Founded: 1980
Employees: 450
Funding: undisclosed
Key metric: labor intensive but profitable
URL: www.geographic.com

GDT competes primarily with Navigation Technologies and Tele Atlas, founded in 1985 and 1984, respectively. NavTech, based in Chicago, focuses on providing data for in-vehicle navigation systems in Europe and North America as well as to AOL/MapQuest.com, Yahoo!, Motorola, the American Automobile Association (AAA) and Garmin, a manufacturer of GPS devices. The company has 100 offices in 18 countries and keeps 400 people on the road, reporting on 150 data attributes for each road segment, including one-way streets, speed categories and access restrictions. Netherlands-based Tele Atlas provides a similar service in Europe and the US for companies such as Siemens, Daimler Chrysler, BMW, Blaupunkt, Microsoft, Michelin and Ericsson.

It's tough to turn a profit in this industry segment, in part because it involves a lot of manual work. Tele Atlas reported a net loss of 18.6 million Euros on revenues of 78.3 million Euros in 2002. Navigation Technologies is private but reported $166 million in global revenues in 2002, turning a profit for the first time in 18 years; the first three quarters of 2003 were also profitable. GDT is also profitable but won't say by how much or for how long.

On the other hand, now that these companies have put in the work, their data will maintain its basic value for a long time: "If we get a street in the outskirts of Des Moines right, it'll probably stay right for 50 years," Cooke says. "I grew up at 32 Stratham Road in Lexington, MA, and it's still 32 Stratham Road."

Manipulate & Integrate Data

ESRI: Beyond the layered look

Now that we have good, clean data, we want to play with it, um, put it to work. We need applications that know how to do simple things such as take a set of data points and turn them into an attractive, readable map. We want to be able to zoom in on that map, revealing different levels of detail. We want to be able to add virtual acetate layers of data culled from other applications and sources to show us where our customers are located. . .or the spread of toxic plumes in the water table. And then we want to come up with new, innovative ways of putting GIS data to work.

Founded 34 years ago as Environmental Systems Research Institute, the company began by building software applications for drawing electronic maps that could have layers of visual data piled on to them. Now, Dangermond says, "People are beginning to conceive of GIS as an information system, not as a way to make pretty maps. We're seeing a huge shift from GIS projects to geographic information systems that provide the basis for running businesses and government agencies." To that end, ESRI has enhanced its service capabilities, introduced a Web server product, and has invested over $300 million rewriting their software to support industry standards.

ESRI INFO

Headquarters: Redlands, CA
Founded: 1969
Employees: 2750
Funding: from founder
Key metric: steady 5-10 percent annual growth
URL: www.esri.com

Dangermond continues, "Our business has been growing 5 to 10 percent every year. The technology gets cheaper as the installed base grows." The company – still private – employs approximately 4000 people worldwide and has sold a million seats to 160,000 customers, bringing in $469 million in revenues in 2002. Projected revenue for 2003 is $490 million.

ESRI is in an excellent position to capitalize on the growth of the GIS industry, in part because it put its software into universities in order to train the current generation. This growth strategy, coupled with ESRI's marketing strengths, have yielded twice the GIS revenues of competitor Intergraph, headquartered in Huntsville, AL. The strength of ESRI's partner program helps as well: Its partners number more than 1500 and include IBM, Microsoft, SAS, SAP and GDT.

As the San Francisco example above showed, and as Dangermond will discuss at next month's PC Forum (and in the March Release 1.0), ESRI's spatial tools are not limited to geography. The same kind of visualization and analysis can be applied to

everything from beds and patients and equipment moving around in a hospital, to office equipment and related phone or broadband accounts and user identity data.

MapInfo: Intelligent places

In 1986, four Rensselaer Polytechnic students had a great idea: If a car had information about its longitude and latitude and an electronic map, an on-board computer could provide directions to the driver's destination. Unfortunately, this was before GPS systems in cars were feasible, so the students proposed installing gyroscopes and sensors along the car's wheels – a Jetson's idea in a Reagan era. So the students left that idea behind – for NavTech and Tele Atlas to pick up years later – and founded MapInfo to deliver high-quality maps to computer desktops instead. (SEE **RELEASE 1.0**, MARCH 2003.)

MAPINFO INFO

Headquarters: Troy, NY
Founded: 1986
Employees: 699
Funding: returned to profitability in Q3 of '03, after a 16 percent decline in revenues in '02
Key metric: more than 600,000 users worldwide in retail,financial services, telecommunications and the public sector.
URL: www.mapinfo.com

Eighteen years later, MapInfo provides customers such as AT&T, the state of New Hampshire and the Federal Emergency Management Agency (FEMA) with applications that enable them to manage and mine geographic data in useful ways.

MapInfo's predictive analytics service uses location information to help companies model their business. For example, says COO Mike Hickey, Home Depot decides where to locate stores in part by combining information about the potential locations with demographic information about the potential customer base. MapInfo predicts buying patterns by analyzing "cluster segments" as small as several city blocks, based on information from warranty cards, census information and marketing surveys supplied by partners. Says Hickey, "A cluster segment lets you do something like a Meyers-Briggs personality test on your customers." While this is of obvious appeal to the retail industry, a variety of police departments – in Los Angeles, New York City and Atlanta and the UK's Scotland Yard – use similar MapInfo tools to look for patterns of crime. MapInfo has amassed a large library of data specialized for industries such as telecommunications, banking, insurance and retail.

The company reported a 16 percent decline in 2002 revenues, to $92.6 million, resulting in a loss of $2.4 million. In 2003 the company reorganized around providing customers with tools to help them analyze location information and diversified its revenue streams by focusing on the public sector. This strategy and the uptick in the economy led the company back to profitability in the second half of 2003. It is also aggressively partnering, for example, with Siebel for integration into sales and

marketing processes. It also recently announced an integration project with Business Objects to add "location-based business intelligence" to that company's business intelligence portal.

Aqui Systems: Did you hear the one about the traveling salesman?

It sounds so simple: Find the cheapest route for a traveling salesman who needs to visit a set of cities and end up where he started from. And it is simple – if you're looking at three cities. But the number of combinations is factorial, so somewhere around your 25th city you have a problem – the traveling salesman problem – that has vexed mathematicians (in one form or another) since it was first discussed by Rowan Hamilton and Thomas Kirkman in the 1800s.

Since few of us except rock stars and presidential candidates (and Esther Dyson!) plan routes with more than a handful of stops, it may seem like an academic brain-teaser. But Brian Sroub, founder and CEO of Aqui Systems, says that traffic routing software actually *does* need to worry about it. While traveling from one city to another may *look* like a route with two stops, a city the size of Boston has about 100,000 places where you can make a left or right turn, and each of those is a potential "stop" between your house in Boston and your destination outside the city.

"That's why if you get directions from a mapping site like Yahoo!, if you know the neighborhood, you probably know a better way to get there," Sroub points out. "Better" doesn't necessarily mean shorter, either. Boston-area locals know which stretch of Massachusetts Avenue is a gridlock nightmare during rush hour, the latest way to navigate around the Big Dig. . .and even which intersections tend to yield the most accidents.

AQUI SYSTEMS INFO

Headquarters: Cleveland, OH
Founded: April 2001
Employees: 11
Funding: $500,000 from Sroub
Key metric: "not planning on going public any time soon"
URL: www.aquisystems.com

Aqui Systems claims to have come up with an algorithm that makes the traveling salesman problem manageable by adding local knowledge to learn about the behavior of the locations – traffic movements, accident frequency and the like by time of day and day of week. Collecting such information is a huge task – and a barrier to competition, says Sroub. By having a more complex view of these costs (both in time and in potential for other loss, such as a traffic accident), the Aqui algorithm can more quickly prune possible pathways: Add the minimum and maximum costs of Road A to Road B, and if the total exceeds the limits set by the user, then eliminate that path and all of its possible branches. In other words, the locations have more meaning/information than is visible in just a geographic map. . . .

Aqui is in the process of gathering the data that it needs, initially from state departments of transportation. It plans on delivering the resulting application to Web browsers, and eventually to portable devices.

Sroub has an impressive marketing resume, starting with Procter & Gamble (which he calls "marketing boot camp"), continuing through Sony and Hearst, and then into the dot-com space where he was VP of marketing at Beyond.com and CEO of Chipshot.com. Those experiences gave him enough of a financial cushion that he's bootstrapping Aqui, though he has letters of intent from trucking giants Schneider and Swift. Stroud says, "We have lots of love. The intent is in 2004 to convert that love into cash."

Distribute Map Data

The next task is actually to deliver the mapping data through useful applications, often in a dedicated, sometimes mobile device such as a car's navigational system. Other applications sit on desktops, in a browser or a specialized client that allows further manipulation of the data.

The most familiar is MapQuest, which delivers 300 million maps to 32 million unique visitors each month. But when Craig Barton, director of product management for MapQuest Business Solutions, talks about delivering maps, he slips into the past tense: "Historically, MapQuest was all about maps and driving directions. Today, we have the best location technology platform on the market and our focus has broadened to a greater solution perspective." A mapping industry executive claiming that his company isn't really about mapping. Sound familiar?

MapQuest's mapping roots certainly go deep: R.R. Donnelley & Sons founded the company in Lancaster, PA, in 1967, to create the road maps gas stations used to give to their customers for free. (Ah, memories!) In February 1996, MapQuest launched the website that transformed the company into a recognized consumer brand. Donnelley spun it off in an August 1999 public offering; one month later, it was acquired by America Online – a $1.1 billion enhancement to its AOL Anywhere strategy.

MapQuest licenses data from GDT and Navigation Technologies, adding map display and routing functionality. In addition to its free consumer site, it distributes its

WHY CAN'T WE ALL JUST AGREE?

How badly the GIS industry now needs to develop and accept standards is a sign of its maturity.

According to David Schell, president of the OpenGIS Consortium (OGC), the leading standards body for the GIS industry, "The long and short of it is that this market has traditionally been balkanized. There are vast data holdings that remain inaccessible because of inadequate public policy, and the private sector doesn't understand yet how to make the investment to fix the problem." He takes location-based services as an example: "Without intelligent 'spatial services' intrinsic to the Web, these can't really exist. And yet the communications infrastructure companies – the telcos, for example – don't know how to collaborate to ensure standardization. Right now the field is characterized by ad-hoc approaches based on narrowly defined, proprietary architectures."

The OGC, founded in 1994 by eight charter members from the commercial, governmental and academic arenas, aims to help the industry by impasse. It currently has 250 members, including almost all the leading players in the industry – with the noteworthy exception of Microsoft. The organization has approved 13 standards so far, says CTO Kurt Buehler. Three are of particular interest:

First, the **Web Map Service**, introduced in 1999, offers a lingua franca for applications to request maps and spatial information from Web servers running GIS software. Buehler says this standard is already being used by hundreds of corporate and academic systems.

Second, the **Web Feature Service** standard provides a language by which an application can request detailed information about the semantic objects – or "features" – of maps, such as streets, buildings, rivers, missile launching pads and tollbooths. For example, an application might request all roads within 100 miles of a specified point. Buehler explains, "While the Web Map Service is excellent for visualization, the Web Feature Service is essential for supporting things like computer-assisted analysis, modeling and decision support."

The third standard, **Geography Markup Language** (GML) is "the only pure data encoding standard of the three," notes Buehler. GML specifies a vendor-neutral way to express the mainstream elements of GIS: points, lines and polygons. It also specifies ways to structure data about specific features such as stations and rails for trains or highways and streets for cars.

While GML can provide a formal way to integrate two applications, the two systems are left to dicker over how to normalize the data. It is the same problem faced by database administrators trying to integrate a database that has a field called "EmployeeName" with another that uses two different fields called "FirstName" and "LastName." Ask Buehler how to integrate mapping applications and he replies with a smile born of personal experience: "Through pain and suffering, the same as for every other set of XML schemas."

The OGC isn't the only organization setting standards. The US Federal Geographic Data Committee (FGDC), an interagency group, is developing the National Spatial Data Infrastructure, defined as "the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community." In 1998, it issued the Content Standard for Digital Geospatial Metadata to "to provide a common set of terminology and definitions for the documentation of digital geospatial data." As Buehler explains, "While the OGC [which partners with the FGDC] works heavily on standards to address the systems interoperability issue, the FGDC works to develop standards required to create data consistency across the nation."

The development and propagation of standards is coming is hitting the usual roadblocks: companies reluctant to give up their proprietary strategies, and the difficulty of getting schema to talk with one another. In short, getting systems to interoperate is easier than it was...but it is still harder than it should be.

data and functionality to companies via Web services APIs or full customer-hosted solutions. Customers include Starwood, U-Haul, Gannett Newspapers and 1,400 other organizations.

MapQuest certainly doesn't have the online mapping field to itself. In March 2002, Yahoo! ended its relationship with MapQuest and built its own service, also using

data from GDT and Navigation Technologies. Rand McNally, with its historic roots deep in cartography, continues to offer online maps and driving directions. AAA lets you design your own "TripTiks" – road maps and directions customized for your route – on their state sites. MapsOnUs.com gives driving directions. Streetmap.co.uk in the United Kingdom uses the Ordnance Survey maps commissioned by the government. The German site route.web.de lets you search for routes and maps on several different engines. With so many sites offering similar services, brand counts, and MapQuest has the brand name. So far.

Microsoft, which bought Vicinity's MapBlast in April 2003 in order to enhance its own MapPoint service, offers similar functionality. MapPoint 2004 bundles data with visualization and analysis tools and includes marketing and demographic data from Simmons Market Research, a leading consumer research group. "They've taken the data down to a couple-of-square-blocks resolution," says Andrew Mackles, group product manager for the MapPoint business unit, "so you can see how many males aged 18 to 24 shop at a 7-11 and buy a Slurpie." It also features thematic mapping, which Mackles compares to "nicely shaded USA Today-style maps. Mackles, joining the "We're not about maps" club, adds, "The thing that's significant about MapPoint 2004 is that it's not meant to be a GIS product. It's more meant for the office, casual decision maker."

Mackles emphasizes the importance of the MapPoint Web Service, the platform side of the Microsoft business unit's offerings. With a GIS application running on a Web server, other applications can much more easily take advantage of the application's capabilities: A developer can simply use a standard protocol to ask the server, for example, to return a graphical map based on the specified coordinates, or to return the longitude and latitude of a particular street address. ESRI and MapInfo have similar offerings, enabling developers who are experts in business processes but not in GIS to integrate GIS functionality into applications.

Following the usual dialectic of technology development, where Microsoft goes there is also an open source alternative. And, just as typically, the open source alternative offers rock-solid baseline functionality and some exceptional specialized functionality, but is not ready with comprehensive, packaged "business solutions."

The University of Minnesota's MapServer is one of the leading open-source offerings. Originally developed as part of the ForNet forestry management project and funded by the state of Minnesota and NASA, MapServer lets an application display a browsable map. As the site notes it, "is not a full-featured GIS system, nor does it

aspire to be." Instead, it's a Web server that can provide the foundation for customized GIS applications. Using open source tools to build the full equivalent of the commercial offerings may be difficult, but it has the usual advantages of using open source components: robustness, support from an enthusiastic community, standards-based, often free. . .and good for the soul.

Distribution Infrastructure

GIS data, of course, often is most useful when the user is mobile. An increasing number of tools both track users and deliver data to them in real time, often filtered or "personalized' according to the user's location. Such devices are designed to interact with location information, whether they sense it directly or are merely informed of the user's location in some other way.

Much of the required infrastructure is being built for rigorous commercial purposes. And much is already in place. There is, however, one glaring weakness: devices that know (and can tell you!) where they are.

At the moment, GPS devices are the dominant way of finding out where you are, within a range of a few meters. GPS technology has certainly advanced in the years since the US government removed its timing errors from GPS satellite transmissions. The receivers are more accurate, cheaper and smaller than ever before. They know where they are within 10 to 20 meters.

Companies that manufacture GPS devices have seen their revenues increase dramatically: Garmin, for example, which sells both to vehicle manufacturers and through retail outlets, saw its revenues almost exactly double from 1999 to 2002 (to $465 million), and net profits rise even more steeply, from $64.2 million to $143 million.

But today's GPS receivers have not improved enough (try getting GPS coordinates from inside your city apartment!) to achieve ubiquity and settle into the background. The solution is going to have to come from alternatives that supplement GPS.

Rosum: Finding you indoors

Who better to tackle the inherent problems of GPS than James Spilker, one of its original architects? Spilker, a consulting professor at Stanford University, was

involved with Geocast, a European consortium researching the use of geostationary satellites as network nodes. It occurred to Spilker that since digital TV signals include a synchronization code similar to those of GPS satellite signals, they could be used to triangulate position in the same way.

He and Matthew Rabinowitz, his former graduate student from Stanford, co-founded Rosum in December 2000 to take advantage of this insight. Rabinowitz had done graduate work in high-precision satellite navigation systems using what he terms "super-weak GPS signals." To test Spilker's theory, they "put together a receiver to try to figure out the exact time the TV sync codes arrived," relates Rabinowitz. "And there was a huge peak on the screen. We realized that we had high-power, wide bandwidth GPS on the ground."

How does Rosum propose to get around the problems with GPS satellite signals? "Physics," answers Rabinowitz. "TV signals are broadcast at megawatt-level radiated powers, typically from 30 to 40 miles away. That makes them 10,000 to 100,000 times stronger than satellite GPS signals." And a stronger signal means a smaller power drain on devices. He continues: "In addition, these TV signals are very wide-bandwidth." The broader the bandwidth, the more accurately you can tell when the signal arrived, which is especially important when signals are bouncing off the walls of concrete canyons in cities. Further, TV signals obviously penetrate walls well.

The system requires Rosum to put a monitor somewhere in the area they're enabling; Rabinowitz says that the area from San Jose through San Francisco could be served with just four boxes. The monitors track the TV signals in the surrounding region, feeding the central Rosum server via the internet with data about the clock drift of each station. The server does the number crunching to determine the device's location, calculations beyond the puny computing power of today's cell phones.

ROSUM INFO

Headquarters: Redwood City, CA
Founded: December 2000
Employees: 25
Funding: $16 million from Charles River Partners
Key metric: plans to launch an urban fleet-tracking application by the end of 2004 in San Francisco and an east coast city
URL: www.rosum.com

The company raised $16 million this past April from Charles River Ventures and hopes to have its first application-specific integrated circuit (ASIC) done in March. It plans on licensing its hardware and software as components in other companies' products. "We've partnered with the big gorillas in various markets," says Rabinowitz. "For example, we're working with Motorola to build an emergency response system and with Trimble to build an asset tracking system." The company is confident that devices using its system can provide indoor accuracy down to 20 meters, and even to

1 to 2 meters if customers will station a special transmitter nearby. That transmitter also enables Rosum technology to assess the altitude of devices, an important feature when tracking first responders (or anyone else) at work in city buildings.

Rosum doesn't intend its approach to replace satellite-based GPS. "No single navigation can solve every problem. The best solutions are integrated," says Rabinowitz. There will be considerable innovation and partnering in this segment before our devices will know precisely where they are as a default.

Wheels of Zeus: Woz happenin'

"Designing pet collars is one of the hardest things you can do," says Steve Wozniak, co-founder of Apple. "They're tiny, you can only fit in small batteries, and pets move around day and night so you can never shut the collars off." Clearly this is no ordinary pet collar. It is the lead example of the device Wozniak's new company, Wheels of Zeus (wOz) is designing as part of a larger spatially-aware platform.

"It started as a joke," Wozniak says. He and his friends were kicking around ideas a couple of years ago when it occurred to him that if they designed a system that would alert people when a pet wandered off, it could also be used to locate children, cars, "not to mention my briefcase in an airport."

Locating lost objects turns out to require much more than a high-tech collar. "We're building a complete system, end to end," he says. That includes the portable device with an embedded GPS system, a server, and even a wireless network using unlicensed spectrum at 900mH. The user establishes boundaries within which the device is permitted to travel. If it transgresses that boundary, the radio transmitter sends an alert to the server, which in turn contacts the user. In order to conserve the battery, the information about the boundaries is stored in the device itself, so it doesn't need to maintain radio contact with the server. "The device has total smarts," he says. "It doesn't use the radio until it has to."

This feature has the added benefit of lowering concerns about people using the system to invade the privacy of others. "We designed our product, maybe without thinking about it, to be a tracker, not a monitoring system," says Wozniak. "The device sits there quiescent until something goes awry. It can't be tracked precisely, unless you

WHEELS OF ZEUS INFO

Headquarters: Los Gatos, CA
Founded: October 2001
Employees: 17
Funding: $10 million from Mobius Venture Capital, Draper Fisher Jurvetson, Palo Alto Investors and Big Sky Partners
Key metric: Motorola is the lead customer
URL: www.woz.com

want to leave it in alert mode. And we've got encryption so someone else can't link their finding device to my pet or my children."

Wozniak founded Wheels of Zeus in October 2001 to create reference designs of the required technology. "Our customers get large circuit boards that they can study and test. It's up to them to lay them out and package them the way they want," he explains. Motorola has become their lead customer.

Wozniak notes, "We have so much work to get this product working well that I haven't had time to think very far about other uses people will come up with. You can't really second guess the world of other people anyway." A low-cost, low-power network that combines the location-finding capability of GPS with the communication capability of radio. . .it's an infrastructure that seems underserved by the pet collar example.

uLocate Communications: Total location awareness

"In four years, every cell phone will have a GPS chip in it," says Alan Phillips, CEO and co-founder of uLocate Communications, a ten-person startup in Newton, MA. He and his two partners came to this insight during a daily round of idea generation. They found out about the US government's E911 mandate that all new cell phones be location-aware by December 2005, and founded uLocate in January 2003 to provide services to people with those phones. The company closed its first round of funding, for $600,000, from GrandBanks Capital in December. It now has 300 beta users.

The uLocate application combines GPS location information with mapping data licensed from MapQuest to enable businesses to know where their employees are. . .and where they've been. For example, uLocate converted the addresses of a lawn-care company's clients into longitudes and latitudes. "Now," says Phillips, "when a truck pulls up to a yard, they have a time clock," because the system knows exactly how long the truck was there. Another example: The manager of a tow-truck company in Connecticut drives one of the ten trucks. When a call for service comes in, he can see on his cell phone where the other nine trucks are and can assign the nearest one available.

uLocate users download onto their phones a small Java program that sends the user's location information to a central server every two minutes. Anyone with permission can track the users – including the

ULOCATE INFO

Headquarters: Newton, MA
Founded: February 2003
Employees: 10
Funding: $600,000 from Grand Banks Capital
Key metric: all US cell phones are required to be location-aware by December 2005
URL: www.ulocate.com

users themselves. So an employer could have the server send to her cell phone a map that displays where her employees have been. Or, like the wOz device, a parent could establish a "geofence" around an area on a map; if her child crosses into or out of that area, the parent is notified by e-mail, text messaging or an automated phone call.

The company is alert to the privacy implications. Phillips stresses that participation is always voluntary, although "voluntary" can, of course, feel a little strained to employees and children. "My son doesn't mind being tracked," says Phillips, "because it's more important to him to be able to find out where his mother is when she's supposed to be picking him up from the soccer game" than to maintain his own privacy. Of course, some parents might choose to make the tracking non-reciprocal.

The company is initially aiming at both consumers and companies; Phillips says that customers so far are about evenly divided between the two. For companies with fewer than ten vehicles, the price is $12.95 per month, with volume discounts available. Beyond that, it is looking for partners, such as fleet management companies, portals and wireless carriers.

Telmap: Protocol for distribution

There once was a sixteen-year-old Israeli with an idea for a protocol that would more efficiently move data onto portable devices. Then the boy met Vitek Tracz, through MAPA, the Israeli equivalent of Navigation Technologies, owned by Tracz's brother. Tracz, it turns out, funds a number of technology and science companies from his headquarters in London, and was investing in the GIS space. In October, 1999 Vitek and the boy (whose identity the company protects) co-founded Telmap to develop the protocol. A few months later, CEO Oren Nissim joined, fresh from Mustop.com, a different kind of location-based company: "US companies weren't shipping abroad, so we'd give people in Israel a local address in the US," Nissim says. Telmap hopes to provide a key part of the infrastructure for delivering data to portable devices, including the current generation of 9,600 Kbps cellular networks.

TELMAP INFO

Headquarters: London
Founded: October 1999
Employees: 65
Funding: $7 million from Current Science Group
Key metric: proprietary protocol for compressing and dlivering vector data
URL: www.telmap.com

"Our protocol is unique," says Nissim. "The data can be moved and stored in chunks sized the way the client device expects." Thus, a single set of data could serve PDAs, wireless computers and cell phones. Delivery of timely data is key. "Geographical data is very dynamic," he says, which is a problem with most GPS navigation systems: "When you preload your GPS navigator, you get a data file

that was prepared some time ago. But we have a server that's freshly updated with data." The client software, written in Java 2 Micro Edition, is portable across devices, although 80 to 85 percent of current installations are on cell phones.

TelMap's customers include Motorola, Orange (the UK cell phone carrier), and MapMinder, below. The company plans to open an office in Chicago by the end of March. It is privately held, funded by Tracz and not yet profitable.

Telmap plan to aggregate not just map data but also other information of use to travelers, such as data from Zagat and Michelin. It's applying this concept with another Tracz-funded company, UK-based Mapbyte. In addition to offering Telmap's real-time tracking, monitoring and asset management services for businesses, Mapbyte runs the consumer-focused Mapminder website. For £24.95 per year, users can track loved ones, create customized maps that include favorite places and Outlook address-book contacts, and consult The Guide, a map of cultural, entertainment events and other listings in a particular area.

Like other destination guides, The Guide accepts user reviews and ratings. Unlike its competition, though, it focuses more on groups of people with shared interests than places about which strangers may leave reviews. Says Nissim, "If we both like to fish, I can post information like my favorite fishing spot, or the spot where I caught a big fish last week, or where I know lots of people will be heading this week to fish, or favorite fishing stores. I give it a description and a place. If you are in my community, you see all the listings and the map. In essence, we think the people who know best about places are just people. We're trying to get them to interact in order to get them to exchange information."

Collaborative Graffiti

GIS infrastructure and applications are the invisible parts of the new spatial infrastructure we're building together. We'll listen to places that talk because of the content. And, in an arc familiar from the movement of the Web, content will rapidly evolve from static information, to dynamic information, to interactive information, and finally to the creation of fluid conversations, relationships and communities. People will interact with their environments electronically much as they do physically. And places will resonate with history and the future more than they do now.

Currently, you have be pretty special to have a plaque marking your presence or a chalk outline marking your death. But in the future you'll be able to leave your own mark, annotating the places that matter to you and engaging in a conversation with other travelers and residents who have something to say – all automatically indexed and virtually attached to the locations where they happened.

We have set markers into the world for millennia, from stones piled on the edges of fields to the million bronze disks – "benchmarks" – that the US Geological Survey has affixed to rock and permanent structures. With wireless networks, we don't have to hammer bronze disks into cement. Our portable computing devices can pick up the information from the Web, transforming our experience of space. As Joshua Schachter of GeoURL says, "There are lots of ideas that no one has implemented. It's the idea equivalent of being on the tip of your tongue."

You can already hear the rustling of spatial ideas, good and bad, for exploring and even creating community.

GeoURL and Localfeeds: The where of blogs

Tools such as MetaCarta (a location-based search engine scheduled to present at PC Forum) and Google's beta Search by Location feature will play an important role in letting us find what the Web has to say about the places where we are. (DISCLOSURE: ESTHER DYSON IS AN INVESTOR IN METACARTA.) But the ad-hoc social network of weblogs may be an especially useful way to orient ourselves in comments about a place – the way a good map orients us in its geography.

That fact makes Joshua Schachter's GeoURL.org, launched in December 2002, particularly interesting. By day, Schachter works at a financial services firm in New York City. On the Web, he's known in part as the creator of GeoURL, a site that indexes pages according to the locations they refer to. GeoURL requires authors to state explicitly the location their page is attached to by inserting longitude and latitude information in a metatag. The site scans for this tag – but unlike Google or MetaCarta, it only indexes pages authors submit to the site. It currently has about 80,000 pages indexed and adds 100 to 200 per day. Each page can be pegged to only a single location "to avoid spammers submitting pages with thousands of locations on them," Schachter says. Besides, he adds, "people are typically indexing blog *entries*, which tend to talk about one location."

Although GeoURL wasn't initially aimed at the blogosphere, it is well suited to it. "I provide RSS feeds [by location] so people can watch their neighborhood – or whatever other location they care about, such as their home town, the college they just left, or a friend's location," Schachter says. (RSS, or Really Simple Syndication, is a standard for aggregating and syndicating online content. See Release 1.0, June 2003.) A salesperson or a reporter could do the same for his territory. You'll find a link to GeoURL on tens of thousands of blogs.

Schachter's next project aims at encouraging the adoption of GIS standards: "The next version of GeoURL will emit its data using WFS [Web Feature Service]," the OpenGIS Consortium standard, he says. This will make it easy for OGC-compliant mapping applications to treat the locations in the GeoURL index as features to be plotted on a map. He hopes that others will use these data and tools to create useful and unexpected applications.

Ross Karchner, creator of Localfeeds.com, is already doing so. Localfeeds adds a more user-friendly interface to the GeoURL concept, aggregating RSS feeds for more cities and adding search by zip code or country. Localfeeds was born of laziness, he contends: "It started with HarrisburgBlogs.com," a metablog he created of blogs in the Harrisburg, PA area. "I used to compile the list of sites and RSS feeds by hand. Eventually, I started looking for ways to make site discovery easier," he explains. Using GeoURL as inspiration, Karchner eventually wrote his own page-location scanner – for Harrisburg as well as other locations, using an automatic notification from GeoURL when a new page is submitted.

Like Schachter, he's got a day job – giving technical support at Knowledge Planet, makers of an online learning management system. Google advertising pays for about two-thirds of the hosting fees of Localfeeds, and he's already thinking of other ways to monetize it. "Localfeeds could be sold to local media, without the webmaster having to know about RSS."

Urban Tapestries: The culture of location

After looking at mobile technologies for six years, Giles Lane became "increasingly frustrated by research done by universities and researchers," he says. "They were almost always only positing a commercial future with no room for the traditional ways we take part in civil society," including such simple traditions as asking passers-by for directions. What Lane sees being proposed "doesn't reflect how people exist in cities or even in rural communities. So we asked how we could design a system that

would start to reflect the richness and complexity of social and cultural practices that people use in their every day life."

Behind Urban Tapestries is Proboscis, a small, nonprofit artists' group run by Lane and Alex Angus. Lane's background is eclectic. He began his career as a filmmaker, and then spent several years working on theoretical architecture projects – buildings designed not to be built but to help us understand how we inhabit space. He has published experimental books, worked for several years at the Computer-Related Design Research Studio at the Royal College of Art, and set up his own research program with the London School of Economics. Urban Tapestries is part of that program, partnering with HP Research Labs, the UK research and development branch of France Telecom (which owns UK cell phone service operator Orange), the Ordnance Survey, and LocustWorld, a small, oddly named wireless networking company. The primary budget of £115,000 ($211,000) comes from the UK Department of Trade and Industry.

URBAN TAPESTRIES INFO

Headquarters: London
Founded: 1993
Employees: 8
Funding: £115,000 from UK Department of Trade and Industry
Key metric:
URL: www.proboscis.org.uk/urban-tapestries/

Lane stresses that eight core members of the team are interested first in social research and are building technology only so they can prototype systems and test ideas. "The traditional location-based service," says Lane, "is turning a guide book into a mobile device. That's fine, but how many weeks per year are we tourists?" The group's hypothesis is that the information non-tourists want is not canned but the kind of information neighbors might offer. For example, it might be a list of shops that sell fair-trade goods, or it might be what local history buffs have written about the area. Urban Tapestry will let you record text or audio that is then accessible at the spots they refer to. "We've tried to design a system that can be used for anything, and instead of channeling people to use it for one thing, the users of the system will create the content and the uses," says Lane.

Urban Tapestries is not committing to any particular delivery device. "We use the Orange GPRS network to provide the Internet connection between a cell phone and the Urban Tapestries server, and with PDAs we use WiFi. We *had* GPS systems for PDAs," says Lane, "but the battery life was so appalling that we had to give everyone an enormous backpack with a battery in it." The user reads notes left about particular spots by clicking on a map on her device, wherever she may happen to be.

The issues are not primarily technical, though. "Urban Tapestries is a framework, not an application," Lane says, "We want to understand what the new social interac-

tions might be." In fact, because technology can be off-putting, Proboscis uses a technique it calls "body storming." Says Lane, "We use familiar technologies like paper, pens and large printed maps to simulate using a mobile device and get people used to the idea of embedding things into the city." People walk over a 10x10-foot floor map, putting sticky notes down where they want. "It gives us advanced usability testing, and it's always surprising. People usually think of putting notes on their favorite cafés, but one person left notes at every spot she'd had a fight with her ex." He adds, "It's an interesting way of thinking about how we navigate through a city."

"It's not just about individuals being egoists," Lane stresses. "It's not people wandering the city reading lists. It's a way of supporting existing social groups. This is a fundamental part of an emergent understanding of what community means to us in the 21st century."

Cimarrones: Virtual graffiti

"We were on our honeymoon in Costa Rica about the same time we were forming this company," says Ryan Janssen. "After white-water rafting on a particularly treacherous stretch of rapids, we asked our guide what they were called. 'Cimarrones,' he said. 'It means runaway slave.' And that embodied everything we were forming this company for."

Ryan Janssen, a former graduate philosophy student, was doing business development for Concrete, an Internet consultancy in New York City, when he met Jessica Lowe, a developer working on back-end systems. In December 2002, they formed Cimarrones to create "an environment that provides a more rational economic structure for people to work in." He says, "Right now our focus is on writing software that takes advantage of the unique paradigm of mobile devices."

CIMARRONES INFO

Headquarters: London
Founded: December 2002
Employees: 2
Funding: about to look for seed round
Key metric: system up and running on all four major UK mobile networks
URL: www.cimarrones.net

Cimarrones' approach is to create services to stimulate cell-phone revenues. The company has found the most success with this approach in the UK. "The mobile operators there realize they're not going to gain any more revenue increases from voice traffic," Janssen says, "so they're opening up their systems, creating reasonable distribution for third parties." For example, the mobile carriers are making their location information available to Cimarrones, enabling the first deployment of its new service, TagAndScan.

TagAndScan is remarkably similar to Urban Tapestries' vision. "I've lived in NYC for a decade," says Janssen, "and I've been to thousands and thousands of places. But I've forgotten about 80 percent of them, which is a hugely diminished asset."

TagAndScan lets a city create a social memory about its place. To participate, the customer begins by downloading onto her cell phone a free Java application. (To be specific, it's the Sun version of Java designed for cell phones, called Mobile Information Device Profile.) At any point, the user can scan an area looking for notes – text or photos – left by others. The application gets the user's location information, accurate to within about 100 meters, from the cellular carrier, which is then used to retrieve notes relevant to the area. Cimarrones pays the carrier a small fee for access to the location information. The user buys bundles of credits from Cimarrones at about 20 to 25 pence each. Each time the user either scans an area or leaves a note it costs one credit.

Notes are clustered in what Cimarrones calls "grids." Public grids are maintained by Cimarrones; Janssen says that Cimarrones re-pins notes that have been attached to wrong locations, and strip out "junk tags" and spam – virtual graffiti, so to speak. Customers can also create private grids accessible only to those with permission. "Private grids let me record drive-by tags, say, of a new French bistro I know I'm going to want to try," he says. Customers can search for tags by place, date or keyword. They can also rate notes, so you can ask to see only notes that have passed a certain threshold of community approval. Janssen says that he and Lowe are thinking about more sophisticated ways of searching, including social networking techniques, although that would happen a couple of product revisions down the line.

In truth, there's no hurry. The system is currently available in the UK on all four major mobile networks (TMobile, Vodafone, O2 and Orange); the technology is so self-contained that it needs only one piece of information – location – from the network. But so far there are only about 350 customers registered in all of the UK. This is evidence, perhaps, that Urban Tapestries is right that the main hurdle is not technological but social

Collaborative photo tagging

Most of us don't whip out a notebook and write a description when we want to remember a place. We pull out a camera – now probably a digital one – and take a photo. The visual has peculiar primacy for us when it comes to places. A number of sites, some experimental, have arisen to help us make that connection better.

At Zien.info, the city of Amsterdam has been reproduced in photos by amateurs. Each photo shows what you would see at a particular street corner. Click on the arrows to turn left, right or backwards. Click on other arrows to advance to the next street corner.

But why merely show what street corners look like? At Geosnapper.com, you can upload your own sequence of photos, indicate where they were taken and create your own "travelogue" – or flip through someone else's. World WideMedia Exchange, an experimental site created by Microsoft Research's Interactive Visual Media Group, does much the same with a slicker user interface. Visitors have uploaded tens of thousands of photographs and pegged them to the spots they picture. Move your mouse over the map of Boston and the thumb-nailed sets of photos change to match where you're pointing. Click on a building at MIT and you'll find a photo of the Bill the Cat mural there. Search for San Francisco, click on Market and Third, and you'll see the snapshots of a parade or march or be-in – sometimes a thousand pictures need a few words to be clear.

These are the sights at locations that residents and visitors thought others would want to see – a quilt of collective interest. It is a fun way to browse, but could it become more than that? As cameras become location-aware – either by the inclusion of GPS-like capabilities or because they're integrated with cell phones that have a rough idea of where they are – it will take a button press to upload photos to sites that organize them by place. Every street corner will then yield its own history as told by the individuals who lived it.

We Are Here

GIS tools are robust. Standards are emerging. Businesses and people are using the tools in ways that matter to them. But something more is happening.

Within the world of business, Dangermond of ESRI puts it well: "We're developing a spatial data infrastructure." An asset's location will become a datum as commonplace as its owner or cost. Businesses will use this data to make their processes more efficient and to make better decisions. This sort of promise gives the GIS industry plenty of room to grow and thrive.

COMING SOON

- Software on the brain.
- PC Forum documentation.
- Nonstructured data analysis.
- The future of e-mail.

- And much more. . . (If you know of any good examples of the categories listed above, please let us know.)

But there's more than business on this earth. The conjunction of hardware, software, data and wireless networks has the potential to give voice to the places we inhabit.

There's a sense in which our places have always talked, have always expressed meaning to those who already know it. Street signs make explicit the metadata of place. Road crews come by and spray paint onto the street where the gas mains are buried. Even before then, paths have been worn into lawns or fields, a fence retains the dent where lightning felled the old maple tree, and the gap in the forest caused by the tornado of 1995 only slowly fills in. The places of the earth have always spoken to us, implicitly or explicitly.

So, what will be different? Until now, the meaning of a place has either been as explicit and anonymous as an historical marker or has been embodied in the way a face shows character or the language of dance is inseparable from the bodies of the dancers. With the advent of the semantic earth, places will have a language separable from their physical presence. The language will be our language. The words will be ours, and so will the gestures and photos. Places will speak in our voices about what matters to us about these places. And these voices will be in conversation across both time and place.

That's to say grandly that information about a place will present itself while you're at that place. But "information" says poorly what this may come to mean to us. We won't just read a plaque that says "In 1783 on this spot. . ." or a local newspaper review calling the restaurant across the street "trendy but worth a nosh." We will hear history as told by local residents and scholars; we will read back-and-forth discussions of the merits of the architecture; we will hear the music the place inspired. Most important, none of us yet know what we will create once we have the ability to give voice to places. We don't know what will emerge from what we create. ■ R 1.0

Resources & Contact Information

Brian Sroub, **Aqui Systems**, 1 (216) 337-3111; fax, (440) 543-3685; bsroub@aquisystems.com
Bruce Forbes, **Archibus**, 1 (617) 227-2508; fax, 1 (617) 227-2509; bruce_forbes@archibus.com
Ryan Janssen, **Cimarrones**, 1 (917) 434-7482; ryan.janssen@cimarrones.net
Erich Seamon, **City and County of San Francisco**, 1 (415) 554 0808; erich.seamon@sfgov.org
Joe Francica, **Directions Magazine**, 1 (256) 650-0205; fax, 1 (256) 650-0255; joe.francica@directionsmag.com
Jack Dangermond, **ESRI**, 1 (909) 793-2853; jdangermond@esri.com
John Young, **ESRI**, (1) 703 506-9515; jpyoung@esri.com
Don Cooke, **Geographic Data Technology**, 1 (800) 331-7881; don_cooke@gdt1.com; www.geographic.com
Joshua Schachter, **GeoURL**, 1 (212) 262-1433; joshua@burri.to; www.geourl.org
Adena Schutzberg, **GIS Monitor**, 1 (617) 970-5347; fax, 1 208-445-4008; adena@gismonitor.com
Simon Williams, **Kleindahl Partners**, 44 (20) 8334-1040, simon.williams@kleindahl.com
Ross Karchner, **Localfeeds**, 1 (717) 221-8819; ross@karchner.com
Mike Hickey, **MapInfo**, 1 (518) 285-6000; fax, (518) 285-7378; mike.hickey@mapinfo.com
Craig Barton, **MapQuest**, 1 (717) 285-8425; fax, 1 (717) 285-8411; craighbarton@aol.com
John Frank, **MetaCarta**, 1 (617) 661-6382; jrf@metacarta.com
Kurt Buehler, **OpenGIS Consortium**, 1 (813) 320-1423; kbuehler@opengis.com
Howard Veregin, **Rand McNally**, 1 (847) 329-6736; fax, 1 (847) 329-9460; hveregin@randmcnally.com
Matthew Rabinowitz, **Rosum**, 1 (650) 421-4000; matthew@rosum.com
Steve Jones, **Sears Roebuck**, 1 (847) 286-7437; fax, 1 (847) 286-1721; sjone78@sears.com
Vitek Tracz, **Telmap**, 44 (20) 7631-9999; vitek@sciencenow.com
Alan Phillips, **uLocate Communications**, 1 (617) 558-6723; fax, 1 (617) 249-2111; aphillips@ulocate.com
Giles Lane, **Urban Tapestries**, 44 (7711) 069-569; giles@proboscis.org.uk
Steve Wozniak, **Wheels of Zeus**, 1 (408) 358-6030

Sites of interest:

OpenGIS Consoritum: http://www.opengis.org
World Wide Media Exchange: http://www.wwmx.org
Waag Society: http://www.waag.org
US Federal Geographic Data: http://www.fgdc.gov/metadata/contstan.html
US government GIS portal: http://www.geodata.gov
Murmur: http://www.murmurtoronto.ca/about.php
Open source GIS site aggregator: http://www.freegis.org
OpenMap: http://openmap.bbn.com/history.html
Remote Sensing http://www.remotesensing.org/projects/hosted.php
JTS Topology suite: http://www.vividsolutions.com/jts/JTSHome.htm
GeoLocator: http://javainetlocator.sourceforge.net/
GeoIP: http://freshmeat.net/projects/geoip/?topic_id=809%2C913%2C910%2C912
Map images on the Web: http://www.maphistory.info/webimages.html

pcforum 2004

The Big Picture - In Focus

This year's exceptional roster of speakers includes veteran industry executives who lead their companies' strategies on technology that is actually being *deployed*. They are serial entrepreneurs such as Google's **Eric Schmidt** and eBay's **Pierre Omidyar**; they are wise technologists such as HP's CTO **Shane Robison** and Charles Schwab's CIO **Dawn Lepore**; they are zealous disruptors such as RealNetwork's **Rob Glaser** and Meetup's **Scott Heiferman**; they are deep thinkers such as Long Now's **Stewart Brand** and author **Steven Johnson**.

Join us to learn more about - and contribute your focus to - the big picture of doing business successfully in today's IT industry.

To register and for updates, please visit http://www.edventure.com/pcforum/

March 21 to 23, 2004 * Fairmont Scottsdale Princess * Scottsdale, Arizona

Release 1.0 Subscription Form

Join the other industry executives who regularly rely on *Release 1.0* . You can also subscribe online at www.release1-0.com.

Your annual *Release 1.0* subscription costs **$795** per year (**$850** outside the US, Canada and Mexico), and includes both the print and electronic versions of 11 monthly issues; 25% off the cover price when you order from our online archives; a *Release 1.0* binder; the bound transcript of this year's PC Forum (a $300 value) and an invitation to next year's PC Forum.

NAME _____

TITLE _____ COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____ COUNTRY _____

TELEPHONE _____ FAX _____

E-MAIL* _____ URL _____

**personal e-mail address required for electronic access.*

☐ My colleagues should read Release 1.0, too!
Send me information about multiple copy subscriptions and electronic site licenses.

☐ Check enclosed ☐ Charge my (circle one): AMERICAN EXPRESS MASTER CARD VISA

CARD NUMBER _____ EXPIRATION DATE _____

NAME AND BILLING ADDRESS _____

SIGNATURE _____

Please fax this form to Brodie Crawford at 1 (212) 924-0240.

Payment must be included with this form. Your satisfaction is guaranteed or your money back.

If you wish to pay by check, please mail this form with payment to: EDventure Holdings, 104 Fifth Avenue, 20th Floor, New York, NY 10011, USA. If you have any questions, please call us at 1 (212) 924-8800; e-mail us@edventure.com; www.edventure.com.